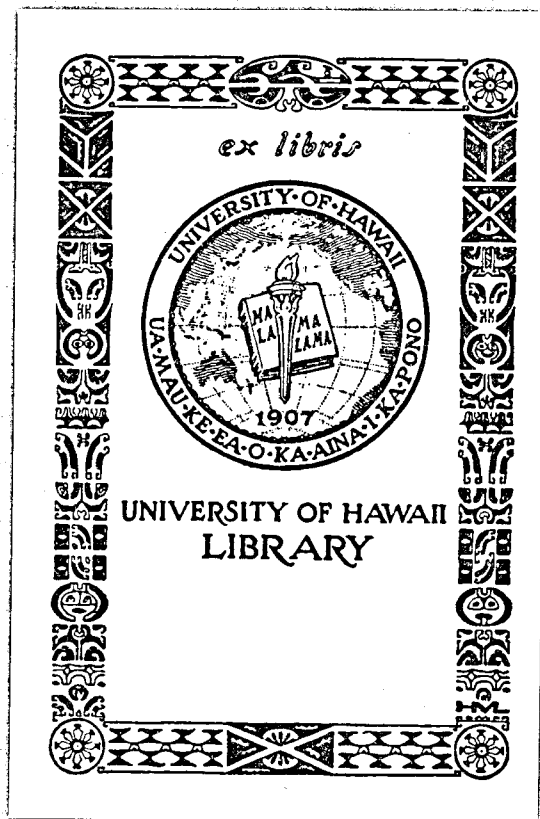


UNDEPRECIATED INVESTMENTS IN IRRIGATION FACILITIES IN HAWAII

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1948

A Supplement to "An Irrigation Census
of Hawaii with Some Comparisons with
Continental United States" (1935)

by

H. A. Wadsworth

**HAWAIIAN SUGAR PLANTERS' ASSOCIATION
JANUARY 1949**

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UNDEPRECIATED INVESTMENTS IN
IRRIGATION FACILITIES IN HAWAII
IN 1948

By H. A. Wadsworth

As a result of a survey of the Hawaiian sugar plantations in 1934, it was reported⁽¹⁾ that about \$39,000,000 had been invested in irrigation facilities in Hawaii during the hundred years in which the local sugar industry had developed to its current stature. A comparison with the Irrigation Census for the United States indicated that by 1935, Hawaii's investments in irrigation works, in spite of the Territory's limited area, were exceeded by only seven of the nineteen western states in which irrigation is a significant factor in agriculture.

Similar comparisons showed that the local investment in terms of capital invested per acre irrigated was many times that for any of the states listed in the Irrigation Census for 1930, while the value of the crop from the average irrigated acre in Hawaii was more than twice that for any western state. The changes since 1935 in Hawaii and elsewhere have been many and far-reaching. The present supplement to the 1935 report is an attempt to bring the figure relating to irrigation investment in Hawaii up to date.

It is probable that no other agricultural area in the United States has experienced as many dislocations in its economy as has Hawaii during the short space of thirteen years which mark the interval between the report of 1935 and this supplement. All of these affected the irrigated plantations. World War II had no sooner begun in Europe than military activities in Hawaii expanded, often with the elimination of sugar production upon irrigated lands near army and navy establishments. Pressing demands for military construction after December 7,

(1) Wadsworth, H. A. (1935). "An Irrigation Census of Hawaii with Some Comparisons with Continental United States" - Hawaiian Sugar Planters' Association.

1941, resulted in the syphoning off of much labor normally employed in sugar production into high-paying defense jobs. A strike of plantation workers in 1946 was particularly serious to those plantations relying upon irrigation. At the present time the costs of labor and of the materials involved in the production of sugar have moved to all time highs. In January, 1935, the price of sugar was about \$55.00 per ton. By January, 1948, the price has moved up to about \$114.00 per ton. It is a splendid commentary upon the courage, vision and resourcefulness of the sugar industry to note that investment in irrigation facilities has continued.

Sources of Information and Methods

In 1934 it was assumed that all significant investments in irrigation works in Hawaii had been made by the sugar plantations and that all irrigation water used was devoted to the production of sugar. This was not exactly true in 1934, as was indicated at the time. It is even less true now. Two irrigated plantations have been liquidated. The waters developed through their costly investments are being used in limited amount in the irrigation of truck and fruit crops in the areas which have been subdivided. These investments are, however, included in the summary of "Undepreciated Capital Invested." For the fact still remains that no significant investment in irrigation development has been effected by other agencies than the sugar plantations and affiliated interests.

In 1946 it was proposed that the facilities of the United States Reclamation Service should be used in the irrigation development of about 2,000 acres of diversified crop land in the Waimea district on the island of Hawaii. These possibilities are still being explored. If the apparent legal difficulties can be resolved and the technical and financial facilities of the Reclamation Service utilized, the Waimea project will mark the first instance of subsidy of any sort in irrigation construction in the Territory of Hawaii.

The policy of continuing to include capital invested in facilities to provide irrigation water for sugar cane, although those facilities are no longer used for that purpose, is in line with that described in the 1935 report. Here it states:

"Moreover, some of the early canals proved inefficient after a few years of service, sometimes because of poor construction but more often because of unfortunate location. In such cases the canals were abandoned and new ones constructed with the investment of new capital. Such abandoned canals are included in the following summary, but are so noted in the supporting appendix.

"Although approved accounting would hold that ----- abandoned canals were fully depreciated and consequently represented no current capital investment, the first cost figures are included here to aid in the visualization of capital which has been involved in the development of modern Hawaiian irrigation practice."

A similar argument is used in the instructions issued by irrigation census enumerators by the Census Bureau in 1940. Here the enumerator is instructed to:

"Include the original cost of the irrigation works plus the cost of extensions and improvements -----."(2)

A similar specification is to be found in the instructions at the time of the Fifteenth Annual Census.(3)

In general information with respect to investments in irrigation works was secured from the engineering officers of the plantations involved. In most cases this information is reported as additions to the data supplied in 1934. In a few instances, the reporting officer chose to report the total investment as of

(2) Sixteenth Annual Census of the United States (1940). Irrigation of Agricultural Lands. Page XII.

(3) Fifteenth Annual Census of the United States (1930). Irrigation of Agricultural Lands. Appendix, Irrigation Schedules.

1948. In such cases the increased investment between 1934 and 1948 was secured by the method of difference.

In one case in which this practice was used, several costly ditches listed as features of the development of underground water on Oahu in 1935, were included among the gravity ditches in 1948. This resulted in an apparent decrease in the investment in underground water on that plantation between these dates. This does not affect the totals reported for the plantation nor the figures reported in the summaries.

In the case of Pioneer Mill Company, Ltd. on Maui, an investment of \$231,000 was omitted during the 1935 summary. This addition is made in the summary for 1935.

Many of the figures contributing to the 1934 totals were based upon estimates. In view of this indefiniteness, all investments were reported to the nearest thousand dollars although recent figures were much more accurate than is indicated by this practice. The same policy of reporting to the nearest thousand dollars has been followed in the preparation of this supplement.

One significant development, involving the improvement and realignment of the Hanapepe Ditch on the island of Kauai, is under construction. Eighteen thousand feet of tunnel have been completed to date. The total cost will be great, but no statement of the actual investment will be available until the work is completed.

Some Comparisons with Continental United States

Although the report of the Sixteenth Census is much more voluminous than any of its predecessors, it fails to include some material which appeared in the earlier volumes and brought Hawaii's unique position into focus. For example, there is no statement in the more recent Census of the cost of preparing land for irrigation in the several states. Nor is there any statement of the value of

the product produced on the average irrigated acre in each of the western states. In the earlier volume reporting the Irrigation Census for 1930⁽³⁾ the crop value for the average irrigated acre in continental United States was given as \$61.50. In 1935 this was compared with a crop value of \$340.00 for Hawaii. It is probable that developments since 1935 have tended to reduce this difference in some degree.

Apparently the period under discussion has been one of rapid expansion of irrigation facilities in continental United States. Capital investments in irrigation works increased markedly between the dates of the Fifteenth Annual Census in 1930 and the Sixteenth in 1940. Table 1 gives the undepreciated capital invested in irrigation works in each of the 19 states in which irrigation is significant, as well as the percentage increase in investment between those dates. Although Hawaii was not included in the Irrigation Census of 1940, the corresponding figures are added for the sake of comparison. It is to be noted that the dates of the canvasses in Hawaii were 1934 and 1948, not 1930 and 1940.

Table 1. Capital Investment in Irrigation
in the Western States, in 1930 and 1940, and the percentage change
between those states(2)

Item	Capital Invested		Increase or Decrease %
	1940	1930	
Total 19 states	\$1,052,039,000*	\$892,747,000*	17.8
Arizona	83,526,000	73,328,000	13.9
Arkansas	5,766,000	6,836,000	- 15.6
California	318,889,000	310,967,000	2.5
Colorado	106,849,000	87,603,000	22.0
Idaho	102,585,000	84,500,000	21.4
Kansas	2,153,000	1,685,000	27.8
Louisiana	11,565,000	15,744,000	- 26.5
Montana	67,352,000	50,319,000	33.9
Nebraska	39,056,000	21,386,000	82.6
Nevada	16,906,000	15,457,000	9.4
New Mexico	32,735,000	19,834,000	65.0
North Dakota	1,755,000	1,267,000	38.5
Oklahoma	272,000	160,000	70.0
Oregon	50,961,000	38,754,000	31.5
South Dakota	5,395,000	4,502,000	19.8
Texas	66,441,000	49,022,000	35.5
Utah	41,896,000	35,669,000	17.5
Washington	56,415,000	40,561,000	39.1
Wyoming	41,522,000	35,153,000	18.1
Hawaii	44,665,000	39,205,000	13.9

* Rounding off the figures for capital investments by states results in totals slightly different from those given in the 1940 census.

In 1935 it was reported that the \$39,000,000 investment for irrigation facilities in Hawaii was exceeded by only seven states. By 1940 Oregon had overtaken Hawaii in irrigation development, as measured by capital invested; many other states were increasing their investments much faster than Hawaii.

The Local Investments in Irrigation Works

For the sake of ready comparison the data having to do with the capital invested in local irrigation works in 1934 and 1948 are assembled in Table 2. Here the total capital invested is divided between gravity and underground water development. The increases are shown in terms of dollars and as percentages of the corresponding investment as reported in 1935. The amounts listed in Table 2 are distributed between the several islands and between plantations on the islands in the appendix.

It should be said once more that the columns involving costs are headed "Undepreciated Capital Invested." These figures are not the current inventory value of the works as shown on the books of the operating plantations. Nor are they to be confused with the high costs which would be involved in duplicating those facilities at present prices. They represent the first costs of irrigation construction in Hawaii at the time that construction was done. Allowances for depreciation and obsolescence are not included.

Table 2

Undepreciated Capital Invested in Development of Gravity and
Underground Water Supplies in Hawaii in 1934 and 1948

Undepreciated Capital in Gravity Supplies

Island	Until 1935	1935-1948	Total	% Increase*	Reference Page+
Hawaii	\$ 2,668,000	\$ 135,000	\$ 2,803,000	5.1	9
Kauai	5,241,000	212,000	5,453,000	4.0	13
Maui	7,544,000	820,000	8,364,000	10.9	27
Oahu	5,595,000	596,000	6,191,000	10.7	35
TOTAL	\$21,048,000	\$1,763,000	\$22,811,000	8.4	

Undepreciated Capital in Development of
Underground Water

Island	Until 1935	1935-1948	Total	% Increase*	Reference Page+
Hawaii	\$ 563,000	\$ 220,000	\$ 783,000	39.2	9
Kauai	2,094,000	175,000	2,269,000	8.4	13
Maui	4,894,000	1,305,000	6,199,000	26.7	27
Oahu	10,606,000	1,997,000	12,603,000	18.8	35
TOTAL	\$18,157,000	\$3,697,000	\$21,854,000	20.3	

Summary for the Territory

	Until 1935	Until 1948	Increase	% Increase
Capital Invested in Gravity Development	\$21,048,000	\$22,811,000	\$1,763,000	8.4
Underground Water Development	18,157,000	21,854,000	3,697,000	20.3
TOTAL	\$39,205,000	\$44,665,000	\$5,460,000	13.9

* Based upon investment as reported in 1935.

+ The reference page given refers to the island summary in the appendix, which distributes the totals given above among the irrigated plantations. Pages immediately following the "reference page" distribute the plantation costs among the several irrigation developments on those plantations.

A P P E N D I X

ISLAND AND PLANTATION SUMMARIES

SUMMARY FOR ISLAND OF HAWAII

Undepreciated Capital Invested Until 1935⁽¹⁾

Plantation	Gravity Development	Underground Water Development	Total
Honokaa Sugar Company	\$1,783,000	\$1,783,000
Kohala Sugar Company	885,000	\$ 563,000	1,448,000
TOTAL	\$2,668,000	\$ 563,000	\$3,231,000

Undepreciated Capital Invested 1935 - 1948

Plantation	Gravity Development	Underground Water Development	Total
Honokaa Sugar Company	\$ 64,000	\$ 64,000
Kohala Sugar Company	71,000	\$ 220,000	291,000
TOTAL	\$ 135,000	\$ 220,000	\$ 355,000

THE ISLAND OF HAWAII - Continued

HONOKAA SUGAR COMPANY⁽⁴⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

Canal	Date of Con- struction	Length in Miles	Undepreciated Capital Invested	Capacity in c.f.s.
Upper Hamakua	1906	...	\$ 620,000	90
Lower Hamakua	1910	...	1,163,000	57
TOTAL			\$1,783,000	

(4) Based upon a statement prepared under the direction of Mr. W. P. Naquin, Manager, Honokaa Sugar Company.

Underground Water Developments
(None)

Undepreciated Capital Invested 1935 - 1948⁽⁵⁾

Gravity Developments

Item	Undepreciated Capital Invested
Concrete lining, Upper Hamakua Ditch	\$45,000
Construction of redwood flume to replace tunnel section	19,000
TOTAL	\$64,000

(5) Based upon information provided by Mr. Leslie W. Wishard, Manager, Honokaa Sugar Company.

THE ISLAND OF HAWAII - Continued

KOHALA SUGAR COMPANY⁽⁶⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

Canal	Date of Con- struction	Length in Miles	Undepreciated Capital Invested	Capacity in c.f.s.	Remarks
Kohala	1905-06	23	\$732,000	75	Total length 22 miles; 13 miles in tunnel section; 20 bridges.
Kahena	1912	13	153,000		Length 13 miles; mountain section in tunnel.
TOTAL			\$885,000		

Underground Water Developments

Motor-driven pumping units	\$ 71,000
Discharge pipe lines	103,000
Abandoned steam plants	140,000
Pro rata cost of power plant based on 68.6% of total cost	<u>249,000</u>
TOTAL	\$563,000

(6) Based upon a statement prepared under the direction of Mr. J. D. Bond,
Assistant Manager, Kohala Sugar Company.

THE ISLAND OF HAWAII - Continued

KOHALA SUGAR COMPANY
Undepreciated Capital Invested 1935 - 1948⁽⁷⁾

Gravity Developments

Item	Undepreciated Capital Invested	Remarks
Honokane Tunnel	\$71,000	This 1,863 foot tunnel, completed in 1938, provides an additional supply of about 4.5 c.f.s. to the Kohala Ditch.
TOTAL	\$71,000	

Underground Water Developments

Item	Undepreciated Capital Invested
Halaula Well	\$ 27,000
Hydroelectric plants ⁽⁸⁾	
Hawi #1 (1936)	37,000
Hawi #2 (1936)	13,000
Union (1940)	54,000
New Pump Shaft, Kohala (1943)	4,000
Diesel power plants ⁽⁸⁾	
Fairbanks-Morse Diesel 300 KWH (1947)	21,000
McIntosh Diesel 625 KWH (1947)	64,000
TOTAL	\$220,000

(7) Compiled from information furnished by Mr. J. S. B. Pratt, Manager, Kohala Sugar Company.

(8) These hydroelectric and diesel-powered generators were necessitated because of increased demands by irrigation pumps.

SUMMARY FOR THE ISLAND OF KAUAI

Undepreciated Capital Invested Until 1935⁽¹⁾

Plantation	Gravity Development	Underground Water Development	Total
Grove Farm Company	\$ 203,000	\$ 203,000
Hawaiian Sugar Company	696,000	\$ 6,000	702,000
Kekaha Sugar Company ⁽⁹⁾	1,424,000	262,000	1,686,000
Kilauea Sugar Plantation Co.	365,000	365,000
The Koloa Sugar Company	530,000	235,000	765,000
The Lihue Plantation Company	983,000	983,000
McBryde Sugar Company	983,000	1,575,000	2,558,000
Waimea Sugar Mill Company ⁽⁹⁾	57,000	16,000	73,000
TOTAL	\$5,241,000	\$2,094,000	\$7,335,000

(9) Reported to nearest thousand dollars.

Undepreciated Capital Invested 1935 - 1948

Plantation	Gravity Development	Underground Water Development	Total
Grove Farm Company	\$ 32,000	\$ 32,000
Olokele Sugar Company ⁽¹⁰⁾	Large but unavailable	\$ 15,000	15,000
Kekaha Sugar Company	24,000	10,000	34,000
Kilauea Sugar Plantation Co.
The Koloa Sugar Company	66,000	66,000
The Lihue Plantation Company	74,000	74,000
McBryde Sugar Company	16,000	150,000	166,000
Waimea Sugar Mill Company
TOTAL	\$212,000	\$175,000	\$387,000

(10) The Olokele Sugar Company was organized as a result of a reorganization which became effective June 30, 1947. The investments reported for the Olokele Sugar Company prior to 1948 were made by the Hawaiian Sugar Company.

THE ISLAND OF KAUAI - Continued

GROVE FARM COMPANY⁽¹¹⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

	Total Undepreciated <u>Capital Invested</u>
Main ditches, reservoirs and pumping plants	\$203,000

(11) Based on communication from Mr. W. P. Alexander, Assistant Manager, Grove Farm Company.

Underground Water Developments
(None)

Undepreciated Capital Invested Until 1948⁽¹²⁾ (13)

Gravity Developments

	Total Undepreciated <u>Capital Invested</u>
Main ditch system	\$141,000
Pumping plants	13,000
Reservoirs	<u>81,000</u>
TOTAL	\$235,000

Underground Water Developments
(None)

(12) In this case increase in undepreciated capital was secured by difference.

(13) Information secured from Mr. A. H. Case, under the direction of Mr. W. P. Alexander, Manager, Grove Farm Company.

THE ISLAND OF KAUAI - Continued

HAWAIIAN SUGAR COMPANY
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

	Date of Con- struction	Length in Miles	Unde- preciated Capital Invested	Capacity in c.f.s.	Remarks
Hanapepe Ditch	1892	13½	\$321,000	52	
Olokele Ditch	1904	14	375,000	105	
TOTAL GRAVITY INVESTMENT			\$696,000		

PUMPING DEVELOPMENTS

One Allis Chalmers booster pump, capacity 2,250 gallons per minute, pumps water from mill ditch against a 130-foot head. This is directly connected to 100 H.P. motor.

Total undepreciated cost: \$6,000.

Undepreciated Capital Invested 1935 - 1948⁽¹⁴⁾

Gravity Developments

The conduit listed as the Hanapepe Ditch in the report of 1935 is being realigned and reconstructed by the Olokele Sugar Company and the Gay and Robinson interests. Much of the new location is in tunnel section.

At the present time (1948) approximately 18,000 feet of tunnel have been driven. No estimate of costs is available.

Underground Water Developments

Domestic well and pump -- \$44,000.

Delivery -- 2.25 c.f.s.

One-third of the water secured is used for irrigation \$15,000

(14) Information secured from Mr. John Moody, Office Manager, Olokele Sugar Company.

THE ISLAND OF KAUAI - Continued

KEKAHA SUGAR CO., LTD. (15)
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

	Date of Construc- tion	Length in Miles	Unde- preciated Capital Invested	Capacity in c.f.s.	Remarks
Fairbanks-Morse Station	1922	..	\$ 29,635.15	..	
Limaloa Pump Station	1922	..	19,024.43	18	
Mohihi-Puuhinahina Ditch	1923	8	521,985.41	45	
Mohihi Reservoir	1924	..	168,581.91	Max. 3,000,000 cu. ft.	
Hydro Power Stations	1907	..	218,119.31	10	
Waimea-Kekaha Ditch	1905	23	466,837.00	Max. 90	
TOTAL			\$1,424,183.21		

Underground Water Developments

	Date of Construc- tion	Length in Miles	Unde- preciated Capital Invested	Capacity in c.f.s.	Remarks
Artesian Wells	1929	..	\$ 20,388.11	30	
Artesian Wells - old	1894-1907	..	20,000.00	20	Estimated value
Kaunalewa Station Pump	1924	..	20,604.41	11	
Makai Electric Pumps	1926	..	58,878.63	109	
Oil Pump Stations	1923	..	9,081.53	30	
Steam Pump - Mana and Kekaha	1907	..	87,700.00	..	Obsolete
Turbo-Electric Station	1930	..	45,000.00	..	56% of Investment
TOTAL			\$ 261,652.68		
GRAND TOTAL			\$1,685,835.89		

(15) Based on a statement prepared under the direction of Mr. L. A. Faye,
Manager, Kekaha Sugar Co., Ltd.

THE ISLAND OF KAUAI - Continued

KEKAHA SUGAR CO., LTD.

Undepreciated Capital Invested 1935 - 1948⁽¹⁶⁾

Gravity Developments

Booster pumps \$24,000

Underground Water Developments

Hulihuli Nui development \$10,000

The work still under construction has already
supplied an additional 9 c.f.s. to the plantation.

(16) Based upon information furnished by Mr. E. F. Shackelton, Office
Manager, Kekaha Sugar Company.

THE ISLAND OF KAUAI - Continued

KILAUEA SUGAR PLANTATION COMPANY⁽¹⁷⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

	<u>Total Undepreciated Capital Invested</u>
Main ditches and reservoirs	\$365,000

Underground Water Developments
(None)

(17) Based on a communication from Mr. Ray M. Allen, Manager, Kilauea Sugar Plantation Company.

Undepreciated Capital Invested 1935 - 1948⁽¹⁸⁾
(None)

(18) Based upon information provided by Mr. J. N. P. Webster, Assistant Manager, Kilauea Sugar Plantation Company.

THE ISLAND OF KAUAI - Continued

THE KOLOA SUGAR COMPANY(19)
Undepreciated Capital Invested Until 1935(1)

Gravity Developments
DITCHES

	<u>Date of Original Construction</u>	<u>Undepreciated Capital Invested</u>	
Paa	1905-06	\$ 24,000	
Mahaulepu	1907-12	30,000	
Wilcox	1914	7,500	
Koloa--Lihue	1915	150,000	
New Mill	1913-22	36,600	
Pakekope	1923-24	8,000	
Kalaiokahoni	1923-27	11,000	
Puuhi	1923-33	13,000	
Koloa--Mahaulepu	1924	9,000	
Old Mill Overflow	1924	1,000	
Puuohewa	1926-27	2,000	
Spring Pump	1926-28	8,000	
Koloa--Mill	1926-27	7,000	
Kaluahonu	1931-32	3,000	
Mahaulepu	1928-33	<u>6,000</u>	\$316,100

RESERVOIRS

	<u>Date of Original Construction</u>	<u>Undepreciated Capital Invested</u>	
Puuohewa and Mauna Kilika	To 1906	\$ 35,000	
Marsh	1907-31	56,000	
Mauna Kilika Inlet	1912-13	8,000	
Puuohewa	1924-25	12,000	
Marsh Western Outlet	1926-30	<u>8,000</u>	\$119,000

PIPELINES

	<u>Date of Original Construction</u>	<u>Undepreciated Capital Invested</u>	
Sundries	To 1918	\$ 37,000	
Puuhi	1919-33	37,000	
Pakekope	1925	2,000	
Kuuewa	1926	5,000	
Omao	1926	5,500	
Kaluahonu	1927-28	<u>2,000</u>	\$ 88,500

(19) Based on a statement prepared by Mr. Hector Moir, Manager, Koloa Sugar Company.

THE ISLAND OF KAUAI - Continued

THE KOLOA SUGAR CO. - Continued
Undepreciated Capital Invested Until 1935⁽¹⁾

TUNNELS

	<u>Date of Original Construction</u>	<u>Undepreciated Capital Invested</u>	
Sundries	To 1906	\$ 4,400	
Wilcox Ditch	1929-30	<u>2,500</u>	<u>\$ 6,900</u>
TOTAL (GRAVITY DEVELOPMENTS)			\$530,500

Underground Water Developments

PUMPS

	<u>Date of Original Construction</u>	<u>Undepreciated Capital Invested</u>	
Mahaulepu	To Dec. 31, 1933	\$ 56,000	
Puuhi	1919-25	21,000	
Kaalana	1927-30	35,000	
Diesel Plant	1925-26	74,000	
Hydro Plant	1918-19	18,500	
Marsh Reservoir	1926-26	<u>30,000</u>	<u>\$234,500</u>
GRAND TOTAL		\$765,000	\$765,000

THE ISLAND OF KAUAI - Continued

THE KOLOA SUGAR CO. - Continued*

Undepreciated Capital Invested 1935 - 1948⁽²⁰⁾

Gravity Developments

Puhi Irrigation Ditch (1936)	\$ 4,000
Concrete Flume, Wilcox Ditch (1937)	5,000
Puhi Syphon (1937)	37,000
Field Four Pipeline (1947)	3,000
Pipe line extension (1943)	14,000
Kalaiokahono Reservoir (1937)	1,400
Enlargement Mauha Reservoir (1937)	<u>1,600</u>
TOTAL	\$66,000

Underground Water Developments
(None)

*The Koloa Sugar Company was merged with Grove Farm Company on June 30, 1948.

(20) Based upon information provided by Mr. F. W. Lawrence, Office Manager.

THE ISLAND OF KAUAI - Continued

THE LIHUE PLANTATION COMPANY⁽²¹⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

Canal	Date of Construction	Undepreciated Capital Invested
Waiawa-awa Kilohana	1926	\$ 43,000
Main Tunnels -- Lihue	1903	122,000
-- Hanamaulu	65,000
Kapaia Ditch	1928	38,000
Hanalei Ditch	1923	395,000
Waiahi--Kua Ditch	1915	199,000
Wailua Storm Ditch	1926	7,000
Makee Ditches	27,000
Makee Tunnels	36,000
East Kauai Water Company	51,000
TOTAL		\$983,000

Underground Water Developments
(None)

(21) Based on a statement prepared under the direction of Mr. C. E. S. Burns, Manager, The Lihue Plantation Co.

Undepreciated Capital Invested 1935 - 1948⁽²²⁾

Gravity Developments

Addition to the Hanalei Ditch	\$19,000
Concrete syphons to replace wood pipe	<u>55,000</u>
TOTAL	\$74,000

Underground Water Developments
(None)

(22) Prepared by Mr. Paul H. Townsley, Office Manager, Lihue Plantation Company.

THE ISLAND OF KAUAI - Continued

MCBRYDE SUGAR COMPANY⁽²³⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

RESERVOIRS

Name	Date of Construction	Capacity in Acre Feet	Undepreciated Capital Invested	Remarks
Alexander	1930-34	2430	\$362,000	Dam still under construction
Others	2940	336,000	Used for long storage; an essential feature of the water supply of the plantation.

CANALS

Name	Date of Construction	Capacity in Acre Feet	Undepreciated Capital Invested	Remarks
Pump 3 Ditch	30	\$ 63,000	Length 5.75 miles
Pump 2 Ditch	18	32,000	Length 1.65 miles
Pump 1 Ditch	15	14,000	Length 0.85 mile
Eleele Ditch	4	19,000	Length 2.70 miles
Reservoir 2 Ditch	37	11,000	Length 2.20 miles
Farley Tunnel	155	37,000	
Lawai Ditches	Variable	7,000	Length 4.50 miles
Kamooloa Ditch	60	63,000	Length 6.05 miles
Hanapepe Ditch	30	12,000	Length 1.50 miles
Others	27,000	These ditches have been abandoned
TOTAL (Gravity Developments)			\$983,000	

(23) Prepared by Messrs. G. G. Kinney and J. B. Cox under the direction of Mr. F. A. Alexander, Manager, McBryde Sugar Co.

THE ISLAND OF KAUAI - Continued

MGBRYDE SUGAR CO. - Continued
Undepreciated Capital Invested Until 1935⁽¹⁾

Underground Water Developments

Electric Pumping Stations	Capacity in c.f.s.	Undepreciated Capital Invested	Remarks
1 . . .	12	
2 . . .	15	
3 . . .	54	\$912,000	
6 . . .	1	
Abandoned	
TOTAL		\$912,000	

Power Development

Wainiha plant, tunnels and ditches	\$488,000
Waihiawa plant	161,000
Mill plant	85,000
Transmission lines	<u>150,000</u>

TOTAL \$884,000

Since 75 per cent of power developed is used for electric pumping, we may charge \$663,000 to irrigation development.

TOTAL INVESTED IN UNDERGROUND WATER DEVELOPMENTS

Electric Pumping Plants	\$ 912,000
Proportionate share of power development	<u>663,000</u>
TOTAL	\$1,575,000

THE ISLAND OF KAUAI - Continued

MCBRYDE SUGAR CO. - Continued
Undepreciated Capital Invested 1935 - 1948⁽²⁴⁾

Gravity Development

Additions to Alexander Dam Spillway (1937)	\$ 7,000
New booster pump for mill water (1938)	<u>9,000</u>
TOTAL	\$16,000

Underground Water Developments

Addition to transmission lines	\$160,000
Additional transformers	25,000
Substation Wainiha and accessories	<u>15,000</u>
TOTAL	\$200,000

Seventy-five per cent of the power developed is used in irrigation
pumping \$150,000

(24) Based upon statements prepared by Mr. Richard Cox and Mr. A. R. Deschwanden, under the direction of Mr. John Sandison, Manager, McBryde Sugar Company.

THE ISLAND OF KAUAI - Continued

WAIMEA SUGAR MILL CO., LTD. (25)
Undepreciated Capital Invested Until 1935(1)

Gravity Developments

	Date of Construc- tion	Length in Miles	Unde- preciated Capital Invested	Capacity in c.f.s.	Remarks
Waimea Main Ditch	1908-13	5	\$57,471.30	15	

Underground Water Developments

	Date of Construc- tion	Length in Miles	Unde- preciated Capital Invested	Capacity in c.f.s.	Remarks
Pumping Stations and Wells	1915-33	..	\$16,304.57	9	
GRAND TOTAL			\$73,775.87		

(25) Based on a statement prepared under the direction of Mr. L. A. Faye,
Assistant Manager, Kekaha Sugar Co., Ltd.

Undepreciated Capital Invested 1935 - 1948(25)

(No investment of any sort in irrigation since 1935)

SUMMARY FOR THE ISLAND OF MAUI

Undepreciated Capital Invested Until 1935⁽¹⁾

Plantation	Gravity Development	Underground Water Development	Total
Hawaiian Commercial & Sugar Company and Maui Agricultural Company	\$5,710,000	\$2,794,000	\$ 8,504,000
Pioneer Mill Company	1,231,000	2,100,000	3,331,000
Wailuku Sugar Company	603,000	603,000
TOTAL	\$7,544,000	\$4,894,000	\$12,438,000

Undepreciated Capital Invested 1935 - 1948

Plantation	Gravity Development	Underground Water Development	Total
Hawaiian Commercial & Sugar Company and Maui Agricultural Company	\$283,000	\$ 435,000	\$ 718,000
Pioneer Mill Company	462,000	395,000	857,000
Wailuku Sugar Company	75,000	475,000	550,000
TOTAL	\$820,000	\$1,305,000	\$2,125,000

THE ISLAND OF MAUI - Continued

THE EAST MAUI IRRIGATION COMPANY
Undepreciated Capital Invested Until 1935⁽¹⁾

reporting for the Hawaiian Commercial and Sugar Company
and the Maui Agricultural Company⁽²⁶⁾

Gravity Developments

Name of Ditch	Date of Original Construction	Estimated Capacity in c.f.s.	Undepreciated Capital Invested	Remarks
Old Hamakua	1879	62	\$ 101,000	Pioneer ditch, unlined, abandoned.
Old Haiku	1880-4	80	444,000	Unlined ditch at too low an elevation, practically abandoned.
Old Waihee	1886	108	322,000	Unlined, still in use.
Lowrie	1899	93	347,000	Unlined, still in use.
Koolau	1903-16	186	1,031,000	Lined; in use.
New Hamakua				
Kauhikoa	1903-20	148	833,000	Partly lined; in use.
New Waihee	1905	84	101,000*	Partly lined; in use.
New Haiku	1912-14	139	846,000	Partly lined; in use.
Wailoa	1924	256	1,608,000+	Lined; in use.
Perched water developments	1930-35	...	77,000	Work distributed among head works of above canals.
TOTAL			\$5,710,000	

(26) Based on a statement prepared by Mr. J. H. Foss, Engineer, East Maui Irrigation Company, and Mr. G. G. Kinney, of Alexander & Baldwin.

* Participation of Hawaiian Commercial and Sugar Company in canal built jointly with Wailuku Sugar Company.

+ Constructed during period of high labor and material costs.

THE ISLAND OF MAUI - Continued

THE EAST MAUI IRRIGATION COMPANY
Undepreciated Capital Invested Until 1935⁽¹⁾

Underground Water Developments

Name or Number of Pump	Plantation	Develop- ment	Depth of Shaft	Length of Tunnel Feet	Water Devel- oped in c.f.s.	Undepre- ciated Capital Invested
1	H.C.&S.Co.	Sump	15	\$ 200,000
Old 2 . . .	"	S&T (a)	...	250	18	54,000
New 2 . . .	"	S & T	120	1000	30	110,000
3 (b) . . .	"	Sump & T	21	191,000
3 booster	"	21	35,000
4	"	Sump	18	157,000
5 & 6 (c)	"	Sump & T	...	1100	..	477,000
7	"	S & T	120	500	60	155,000
1 Kihee (d)	"	Sump & T	...	1600	18	134,000
3 Kihee (e)	"	S	300	300	33	221,000
1 & 2 Maliko M.A. Co.		Sump	10	
1 & 2 Paia	"	"	12	278,000
4 & 5 Paia	"	"	13	
3	"	Sump & T	9	56,000
6	"	" "	...	600	18	511,000
7	"	S & T	300	600	18	104,000
9	"	S & T	155	350	10	32,000
Mill Pump	"	S & T	150	300	9	34,000
Underground Water De- velopment	"	45,000
TOTAL						\$2,794,000

(a) S = shaft; T = tunnel.

(b) Old Steam pump delivered 9 c.f.s. New Pump delivers 21 c.f.s. Cost figure above includes both pumps.

(c) Old Pump 5 (15 c.f.s.) rebuilt as 5A (15 c.f.s.) and 5B (21 c.f.s.). New 6 under construction to supply 38 c.f.s. Total book cost to date included.

(d) Old 1 Kihee (8 c.f.s.) replaced by New 1 Kihee giving 19 c.f.s. Cost of both pumps given.

(e) Old 3 Kihee (23 c.f.s.) replaced by New 3 Kihee (34 c.f.s.).

THE ISLAND OF MAUI - Continued

THE EAST MAUI IRRIGATION COMPANY
Undepreciated Capital Invested 1935 - 1948⁽²⁷⁾

reporting for the Hawaiian Commercial and Sugar Company and Maui Agricultural Company. These companies were combined on April 1, 1948 and now operate as the Hawaiian Commercial and Sugar Company.

Gravity Developments

Item	Undepreciated Capital Invested
Improvements to ditch systems	
Lowrie Ditch	\$ 17,000
Koolau Ditch	56,000
New Hamakua-Kauhikoa Ditch	30,000
New Waihee Ditch	14,000
Wailoa Ditch	3,000
New Haiku Ditch	21,000
Perched water developments	
At and near head of Koolau Ditch. (Part of this work lead to drilling of Kuhiwa well.)	142,000
TOTAL	\$283,000

(27) Reported by Mr. F. D. Lehman, under the direction of Mr. R. N. Thomas, Acting Manager, East Maui Irrigation Company.

THE ISLAND OF MAUI - Continued

THE EAST MAUI IRRIGATION COMPANY
Undepreciated Capital Invested 1935 - 1948

reporting for the Hawaiian Commercial and Sugar Company and Maui Agricultural Company. These companies were combined on April 1, 1948 and now operate as the Hawaiian Commercial and Sugar Company.

Underground Water Development

Name or Number of Pump	Plantation	Develop- ment	Depth of Shaft	Length of Tunnel Feet	Water Devel- oped in c.f.s.	Undepre- ciated Capital Invested
New 2H	H.C.&S.Co.	S & T	130	1400	30	\$ 2,000
New 3H						
3H Booster	"	S & T	202	800	23	97,000
8H	"	S & T	80	190	23	22,000
1 Kihee	"	S & T	23	1600	18	6,000
3 Kihee	"	S & T	323	350	33	9,000
New 3 & 4 Kahaka	"	S & T	548	300	22	114,000
7 Paia	"	S & T	300	850	18	1,000
Mill Pump 12 Kuau, Paia	"	S & T	150	1125	34	66,000
TOTAL						\$317,000

Kuhiwa Well -- Diamond drilling in the course of the perched water developments lead to the discovery of the Kuhiwa-Nahiku artesian water which rose to 1100± feet elevation in the drill holes. In 1947 an experimental well was put down to try to develop this artesian water, but because of the denseness of the aquefer, no satisfactory yield could be obtained and the well had to be abandoned.

\$118,000

GRAND TOTAL

\$435,000

THE ISLAND OF MAUI - Continued

PIONEER MILL COMPANY
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments⁽²⁸⁾

Name of Ditch	Date of Original Con- struction	Estimated Capacity in c.f.s.	Unde- preciated Capital Invested
# Honokohau Ditch	1904	45	\$ 171,000
Tunnel	1912-13	105	582,000
Honokohau Ditch across plantation	1905	105	69,000
# 1st Honokowai Flume		40	6,000*
# 2nd Honokowai Flume	1902	40	12,000*
# Kahoma Flume	1902	40	9,000*
# Kauaula Flume	1911	40	6,000*
Honokowai Tunnel	1918	60	134,000
Kahoma Tunnel	1910	60	70,000
Lahainaluna Ditch to intake	1905	75	5,000*
Lahainaluna Ditch across plantation	1910	75	30,000
Kauaula Tunnel	1929	45	89,000
Launiupoko Ditch	1910	7	13,000*
Olowalu Ditch	1905	13	21,000*
Ukumehame Ditch	1905	23	14,000*
TOTAL			\$1,231,000

The Honokohau development belongs to the Baldwin Packers, Ltd. At present water is sold by that company to Pioneer Mill Company, Ltd. Early investments by H. P. Baldwin amounted to \$242,000 and this amount is now carried on the books of the Baldwin Packers, Ltd. Improvements by Pioneer Mill Company, Ltd. under conditions of an early lease have amounted to \$340,000. The Honokohau development is listed with the gravity developments of Pioneer Mill Company, Ltd. since it contributes to the water resources of that plantation.

Underground Water Developments⁽²⁹⁾

Pumps in operation and foundations	\$ 202,000
Buildings	105,000
Pipe lines	309,000
Wells and tunnels	196,000
Proportionate share of electric system	644,000
First cost of abandoned pumping plants	644,000
TOTAL	\$2,100,000

Abandoned.

* Estimate.

(28) Prepared by Mr. C. A. Brown, Engineer, Pioneer Mill Company, Ltd., in 1934 and modified by Mr. J. T. Moir, Jr., Manager of Pioneer Mill Company, Ltd., December 1948.

(29) Prepared by Mr. E. Butler Smith, Pump Engineer, Pioneer Mill Company, Ltd.

THE ISLAND OF MAUI - Continued

PIONEER MILL COMPANY
Undepreciated Capital Invested 1935 - 1948⁽³⁰⁾

Gravity Developments

Item	Undepreciated Capital Invested
Reservoir construction	\$462,000 ⁽³¹⁾
TOTAL	\$462,000

Underground Water Developments

Item	Undepreciated Capital Invested
Pump buildings	\$ 1,500
Pumping machinery	88,000
Pipe lines	179,000
Wells and tunnels	12,000
Proportionate share of electric system	114,500
TOTAL	\$395,000

(30) Reported by Mr. S. G. Robertson, under the direction of Mr. J. T. Moir, Jr., Manager of Pioneer Mill Company.

(31) Of this item \$430,000 was invested prior to 1935 but was not reported at that time.

THE ISLAND OF MAUI - Continued

WAILUKU SUGAR COMPANY⁽³²⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

Canal	Date of Con- struction	Length in Miles	Undepreciated Capital Invested	Capacity in c.f.s.
North Waiehu	1903			
Naniania				
Iao-Waikapu	to		\$407,000	
Everett				
South Waikapu	1907			
Waihee*	1905		196,000	84
TOTAL			\$603,000	

Underground Water Developments
(None)

* The Waihee Canal was a joint venture of the Wailuku Sugar Company and the Hawaiian Commercial and Sugar Company. The \$196,000 listed above is the participation of the Wailuku Sugar Company.

(32) Based on a statement prepared by Mr. Robert Bruce, Engineer, Wailuku Sugar Company.

Undepreciated Capital Invested 1935 - 1948⁽³³⁾

Gravity Developments

Canal	Date of Con- struction	Length in Feet	Capacity in c.f.s.	Undepreciated Capital Invested
Iao Tunnel	1942	4600	3.6	\$ 75,000
TOTAL				\$ 75,000

Underground Water Developments

Item	Date of Con- struction	Capacity in c.f.s.	Undepreciated Capital Invested
Wailuku Shaft	1948	22.5	\$475,000
TOTAL			\$475,000

(33) Prepared from information provided by Mr. R. M. Allen, Manager of Wailuku Sugar Company.

SUMMARY FOR THE ISLAND OF OAHU

Undepreciated Capital Invested Until 1935⁽¹⁾

Plantation	Gravity Development	Underground Water Development	Total
Ewa Plantation Company	\$ 2,274,000	\$ 2,274,000
Honolulu Plantation Company	\$ 779,000	1,402,000	2,181,000
Kahuku Plantation Company	63,000	544,000	607,000
Oahu Sugar Company	3,429,000	3,461,000	6,890,000
Waialua Agricultural Company	1,239,000	2,124,000	3,363,000
Waianae Plantation Company	519,000	519,000
Waimanalo Sugar Company	85,000	282,000	367,000
TOTAL	\$5,595,000	\$10,606,000	\$16,201,000

Undepreciated Capital Invested 1935 - 1948

Plantation	Gravity Development	Underground Water Development	Total
Ewa Plantation Company	\$1,026,000	\$1,026,000
Honolulu Plantation Company	654,000	654,000
Kahuku Plantation Company	156,000	156,000
Oahu Sugar Company	\$104,000	177,000	281,000
Waialua Agricultural Company	489,000	- 202,000	287,000
Waianae Plantation Company	186,000	186,000
Waimanalo Sugar Company	3,000	3,000
TOTAL	\$596,000	\$1,997,000	\$2,593,000

THE ISLAND OF OAHU - Continued

EWA PLANTATION COMPANY⁽³⁴⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments
(None)

Underground Water Developments

		<u>Undepreciated Capital Invested</u>
Pumping Equipment:		
Pump Wells	\$296,000	
Pump Buildings	162,000	
Pump Machinery	795,000	
Oil Tanks	<u>22,000</u>	\$1,275,000
Power System for Pump Operation ⁽³⁵⁾ :		
Electric Power plant	\$148,000	
Electric Shop and Warehouse	29,000	
Electric Pole Lines	<u>100,000</u>	277,000
Internal Water Distribution ⁽³⁶⁾ :		
Reservoirs	\$ 48,000	
Pipe Lines	215,000	
Flumes and Waterways	447,000	
Overhead Irrigation System	<u>12,000</u>	<u>722,000</u>
TOTAL		\$2,274,000

(34) Based on a statement prepared under the authority of Mr. George F. Renton, Manager, Ewa Plantation Company.

(35) Based on 64 per cent of the total invested undepreciated capital.

(36) Not including field ditches.

THE ISLAND OF OAHU - Continued

EWA PLANTATION COMPANY
Undepreciated Capital Invested 1935 - 1948⁽³⁷⁾ (39)

Gravity Developments
(None)

Underground Water Developments

	<u>Undepreciated Capital Invested</u>
Pumping Equipment:	
Pump Wells	\$389,000
Pump Buildings	175,000
Pump Machinery	896,000
Oil Tanks	<u>22,000</u>
	\$1,482,000
Power System for Pump Operation ⁽³⁸⁾ :	
Electric Power Plant	\$227,000
Electric Shop and Warehouse	30,000
Electric Pole Lines	<u>153,000</u>
	410,000
Reservoirs	49,000
Pipe Lines	303,000
Internal Water Distribution:	
Flumes	\$341,000
Waterways	703,000
Overhead Irrigation System	<u>12,000</u>
	<u>1,056,000</u>
TOTAL	\$3,300,000

(37) Based on a statement prepared by Mr. M. F. Malancon, Assistant Office Manager, under the direction of Mr. H. J. W. Taylor, Assistant Manager, Ewa Plantation Company.

(38) This is 64 per cent of total undepreciated capital.

(39) The increase of \$1,026,000 in the investment in underground water development given in the Summary for the Island of Oahu was secured by the method of difference.

THE ISLAND OF OAHU - Continued

HONOLULU PLANTATION COMPANY⁽⁴⁰⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

	<u>Undepreciated Capital Invested</u>
McCandless Ditch	\$ 101,000
Reservoirs, pipe lines and ditches (excluding field distributing system)	<u>678,000</u>
TOTAL	\$ 779,000

Underground Water Developments⁽⁴¹⁾

	<u>Undepreciated Capital Invested</u>
Wells and Tunnels	\$ 164,000
Pump Pits and Buildings	110,000
Pumps and Foundations	1,114,000
Wells other than those connected to pumps	<u>14,000</u>
TOTAL	\$1,402,000

(40) Based upon a statement prepared under the direction of Mr. A. A. Scott, Manager, Honolulu Plantation Company.

(41) See following page for details of dates of construction, tunnel lengths and pump capacities.

HONOLULU PLANTATION COMPANY - Continued

Irrigation Supply Data

Year of Instal- lation	Pump No.	Type of Unit	Rated Cap. per 24 Hrs.*	Dis- charge Head- Feet	Source of Water Supply	Suction Header Tunnel Length Feet	No. of Wells	Appr. Depth of Wells Feet
1899	1	3 Cyl. Triple Expansion	20 M.	90	Wells	P- 855		
	1	Centrif. Pump, Motor driven	19 M.	75	"	745	13	433 to 500
	2	Centrif. Pump, Diesel driven	7 M.	210	"	P- 950		
to	2	Centrif. Pump, Diesel driven	10 M.	320	"	1100	20	800
	3	Centrif. Pump, Motor driven	7 M.	120	"	P- 331		
	3	Centrif. Pump, Motor driven	9 M.	330	"	345	8	500
	4	4 Cyl. Duplex Engine	7 M.	450	"	P- 400		
	4	4 Cyl. Duplex Engine	7 M.	450	"	425	9	405 to 955
1905	5	Centrif. Pump, Motor driven	5 M.	190	"	P- 210		
						225	5	500
1909	6	Centrif. Pump, Motor driven	7 & 9 M.	230 180	Surface Water
1927	7	Centrif. Pump, Motor driven	4 & 7 M.	215 140	Wells	157	4	175 to 180
1928	9-Booster	Centrif. Pump, Motor driven	3 M.	45	Booster Pump
1928	10-Booster	Centrif. Pump, Motor driven	4 M.	95	" "
1928	8-Booster	Centrif. Pump, Motor driven	1/2 M.	70	" "

* Discharge given in millions of gallons per 24 hours.

THE ISLAND OF OAHU - Continued

HONOLULU PLANTATION COMPANY(42) (43)
Undepreciated Capital Invested 1935 - 1948

Gravity Developments
(None)

Underground Water Developments

Additions to reservoirs, pipe lines, pumps, wells and
main pump ditches between 1935 and January 1, 1947
amounted to \$654,000

(42) Prepared from information compiled from annual reports of
the Honolulu Plantation Company by Mr. Richard Cooke, Plantation
Manager, C. Brewer and Co., Ltd., Honolulu.

(43) Honolulu Plantation Company became a part of the Oahu
Sugar Company on January 1, 1947.

THE ISLAND OF OAHU - Continued

KAHUKU PLANTATION COMPANY⁽⁴⁴⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

	<u>Undepreciated Capital Invested</u>
Punuluu Ditch	\$ 39,000
Old Gravity Syphons (abandoned)	16,000
Punuluu Syphon	<u>8,000</u>
TOTAL	\$ 63,000

Underground Water Developments

Drilling of Flowing Wells (25)	\$ 54,000
Steam Pumping Plants	128,000
Electric Pumping Plants	168,000
Power development (based on 46% of total)	19,000
Transmission lines	18,000
Pump 5 Syphon	2,000
First cost of abandoned pumping plants	153,000
Railroad spurs -- required to maintain pumping plants (operating and abandoned)	<u>2,000</u>
TOTAL	\$544,000

(44) Based on a statement prepared under the direction of Mr. G. W. Fisher,
Assistant Manager, Kahuku Plantation Company.

THE ISLAND OF OAHU - Continued

KAHUKU PLANTATION COMPANY - Continued
Undepreciated Capital Invested 1935 - 1948(45)

Gravity Developments
(None)

Underground Water Developments

	<u>Undepreciated Capital Invested</u>
Reservoir	\$ 14,000
Irrigation pump, pumping plants	79,000
Power developments	34,000
Transmission lines	<u>29,000</u>
TOTAL	\$156,000*

* Power developed and transmitted as a result of these investments was used exclusively for irrigation pumping.

(45) Prepared by Mr. E. B. Holroyde under the direction of Mr. C. E. S. Burns, Jr., Manager, Kahuku Plantation Company.

THE ISLAND OF OAHU - Continued

OAHU SUGAR COMPANY⁽⁴⁶⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments⁽⁴⁷⁾

Name of Ditch	Date of Original Con- struction	Estimated Capacity in c.f.s.	Unde- preciated Capital Invested	Remarks
Kipapa	1897-98	84		Tunnels and ditches all lined.
Waikakalaua	1899-00	81		Unlined.
Waiawa	1901-02	60		Unlined.
Waiahole	1913-16	188	\$2,678,000	Tunnels and ditches all lined.
Main plantation ditches & flumes	682,000	32 miles lined ditches; 50 miles unlined ditches O. S. Co.
Syphons and tunnels	69,000	
TOTAL			\$3,429,000	

Underground Water Developments

<u>Item</u>	<u>Undepreciated Capital Invested</u>	<u>Remarks</u>
Wells	\$ 263,000	
Pipe Lines	706,000	12.4 miles of 20, 24 and 30 inch pipe.
Pump Machinery	1,971,000	Capacity 100 M.G.D.
Pump Buildings	79,000	
Pump Machine Shop	24,000	
Oil Tank for Pump #4	21,000	Capacity 500,000 gallons.
Pump Power Lines	43,000	
Reservoirs	<u>354,000</u>	Combined capacity 434 M.G.
TOTAL	\$3,461,000	

(46) Based on a statement prepared under the direction of Mr. E. W. Greene,
Manager, Oahu Sugar Company.

(47) These gravity ditches are owned and operated by the Waiahole Water
Company, a subsidiary corporation supplying water only to Oahu Sugar Company.

THE ISLAND OF OAHU - Continued

OAHU SUGAR COMPANY - Continued
Undepreciated Capital Invested Until 1948⁽⁴⁸⁾ ⁽⁴⁹⁾

Gravity Developments

Name of Ditch	Date of Original Construction	Estimated Capacity in c.f.s.	Undepreciated Capital Invested	Remarks
Kipapa	1897-98	84		All lined.
Waikakalaua	1899-00	81		Unlined.
Waiawa	1901-02	60		Unlined.
Waiahole	1913-16	188	\$2,678,000	Tunnels and ditches all lined.
Main plantation ditches and flumes	786,000	32 miles lined ditches; 50 miles unlined ditches
Syphons and tunnels	69,000	O. S. Co.
TOTAL			\$3,533,000	

Underground Water Developments

Item	Undepreciated Capital Invested	Remarks
Pump Buildings	\$ 79,000	
Pump Machinery	1,988,000	Capacity 100 M.G.D.
Reservoirs	370,000	Combined capacity 434 M.G.
Pipe Lines	830,000	12.4 miles of 20, 24 and 30 inch pipe.
Irrigation Wells	269,000	
Oil Tank at Pump #4	21,000	Capacity 500,000 gallons.
Pump Power Lines	57,000	
Pump Machine Shop Building and Equipment	24,000	
TOTAL	\$3,638,000	

(48) Prepared under the direction of Mr. H. L'Orange, Manager, Oahu Sugar Company.

(49) The increase of \$281,000 in the investment in irrigation facilities as listed in the Summary for the Island of Oahu was secured by difference.

THE ISLAND OF OAHU - Continued

WAIALUA AGRICULTURAL COMPANY⁽⁵⁰⁾
Undepreciated Capital Invested Until 1935⁽¹⁾

Gravity Developments

Ditches	Date of Original Con- struction	Estimated Capacity in c.f.s.	Unde- preciated Capital Invested	Length in Miles	
				Total	Tunnel
Waimea	1903	55	\$ 47,000	3.20	1.80
Kamalanui	1901	55	89,000	3.70	3.25
Kawaiiki	1902	55	34,000	2.00	1.75
Opauala	1900	55	64,000	1.85	1.45
Helemano Upper	1902	55	33,000	3.90	2.00
Helemano-Poamoho Bridge	1909	24	9,000	1.15	1.00
Outlet Helemano, Upper Reservoir	1911	35	5,000	2.00
Wahiawa	1904	85	61,000	4.00	3.65
Wahiawa Extension	1905	85	24,000	8.20
Kemoo 2	1906	20	17,000	4.10	1.20
Ito	1902	20	24,000	5.50	0.10
Wilson	1900	30	28,000	6.80
TOTAL			\$435,000		

<u>Syphons</u>	<u>Undepreciated Capital Invested</u>	<u>Remarks</u>
Wahiawa Extension	\$72,000	3-54"; 1-30"
Ito	9,000	1-16"; 1-24"
TOTAL	\$81,000	

Reservoirs:

Dates of construction 1902-19
Combined capacity 1000 acre feet
Total Undepreciated Capital Invested \$174,000

(50) Based on a statement prepared under the direction of Mr. J. H. Midkiff, Manager, Waialua Agricultural Company.

THE ISLAND OF OAHU - Continued

WAIALUA AGRICULTURAL COMPANY - Continued
Undepreciated Capital Invested Until 1935(1)

Gravity Developments - Continued

WAHIAWA WATER COMPANY(51)

	<u>Date of Original Construction</u>	<u>Undepreciated Capital Invested</u>
Wahiawa Dam	1902	\$268,000
Spillway	1902	181,000
Mauka Ditch	1902	82,000
Poamoho Development	1925	<u>18,000</u>
TOTAL		\$549,000

SUMMARY (GRAVITY DEVELOPMENTS)

Ditches	\$ 435,000
Syphons	81,000
Reservoirs	174,000
Wahiawa Water Company	<u>549,000</u>
TOTAL	\$1,239,000

Underground Water Developments

<u>Item</u>	<u>Date of Original Con- struction</u>	<u>Unde- preciated Capital Invested</u>	<u>Remarks</u>
Wells	1898 and later	\$ 257,000	88 connected to pumps, 26 flowing.
Pump Machinery and Pipe Lines		1,054,000	14 pumps.
Pump Buildings		78,000	
First cost of abandoned pumping plants		200,000	
Pump Ditches		200,000	Estimate.
Pump Syphons		77,000	
Proportionate share of electric power system		258,000	2/3 irrigation, 1/3 mill and domestic.
TOTAL		\$2,124,000	

(51) An independent corporation formed to develop water at Wahiawa for use on lands of Waialua Agricultural Company.

THE ISLAND OF OAHU - Continued

WAIALUA AGRICULTURAL COMPANY - Continued
Undepreciated Capital Invested Until 1948⁽⁵²⁾ (53)

Gravity Developments

	<u>Undepreciated Capital Invested</u>
Ditches:	
Waimea	\$ 47,000
Kamananui	89,000
Kawailiki	34,000
Opaeula	64,000
Helemano Upper	33,000
Helemano-Poamoho Bridge	9,000
Outlet Helemano Reservoir	8,000
Wahiawa	61,000
Wahiawa Extension	25,000
Kemoo 2	17,000
Ito	25,000
Wilson	<u>14,000</u>
TOTAL	\$ 426,000
Syphons:	
Wahiawa Extension	\$ 77,000
Ito	<u>9,000</u>
TOTAL	86,000
Reservoirs	249,000
Main ditches essential to the operation of the enterprise	418,000

WAHIAWA WATER COMPANY

Wahiawa Dam	\$268,000
Spillway	181,000
Mauka Ditch	82,000
Poamoho Development	<u>18,000</u>
TOTAL	<u>549,000</u>
TOTAL GRAVITY DEVELOPMENTS	\$1,728,000

(52) Based upon information secured from Mr. John W. Anderson, Assistant Manager, Waialua Agricultural Company.

(53) In this case the increase in invested capital between 1935 and 1948 is secured by the method of difference.

THE ISLAND OF OAHU - Continued

WAIALUA AGRICULTURAL COMPANY - Continued
Undepreciated Capital Invested Until 1948

Underground Water Developments

	<u>Undepreciated Capital Invested</u>
Wells	\$301,000
Pumping machinery and pipe lines	862,000
Pump buildings	203,000
Pump syphons	69,000
Abandoned pumping plants	200,000
Proportionate share of electric power system ...	<u>287,000</u>
TOTAL	\$1,922,000

THE ISLAND OF OAHU - Continued

WAIANAE PLANTATION COMPANY(54)*
Undepreciated Capital Invested Until 1935(1)

Gravity Developments
(None)

Underground Water Developments

<u>Item</u>	<u>Undepreciated Capital Invested</u>
Flumes	\$112,000
Ditches, Waterways and Weirs	13,000
Pipe Lines	9,000
Pumps and Power Plant	316,000
Pump 10	6,000
Reservoirs	47,000
Water development (Tunnels, etc.)	<u>16,000</u>
TOTAL	\$519,000

(54) Based on a statement prepared by Mr. Robert Fricke, Manager, Waianae Plantation Company.

Undepreciated Capital Invested 1935 - 1948(55)

Gravity Developments
(None)

Underground Water Developments

<u>Item</u>	<u>Undepreciated Capital Invested</u>
Irrigation Flumes	\$ 14,000
Irrigation Ditches	38,000
Pipe Lines and Syphons	68,000
Pumps, Power Plant, Tunnels and Water Development	62,000
Reservoirs	3,000
Measuring Devices	<u>1,000</u>
TOTAL	\$186,000

* Waianae Plantation Company was liquidated on September 8, 1948.

(55) Based upon a statement prepared by Mr. W. W. G. Moir of American Factors, Limited.

THE ISLAND OF OAHU - Continued

WAIMANALO SUGAR COMPANY*(56)
Undepreciated Capital Invested Until 1935(1)

Gravity Developments

Station	Develop- ment	Date of Con- struction	Length of Tunnel in Feet	Unde- preciated Capital Invested
Maunawili	Gravity	1893	2,600	\$ 85,000
Lagoon	Sump	1895		48,000
Kawainui	Sump to Underground	1922	10,675	234,000
TOTAL				\$367,000

(56) Based on a statement prepared by Mr. George Chalmers, Jr., Manager, Waimanalo Sugar Company.

Undepreciated Capital Invested 1935 - 1948(57)

Shaft for water development in Waimanalo Lagoon (1946).

No new water was developed by this enterprise \$3,000

* Waimanalo Sugar Company is in process of liquidation.

(56) Prepared from information supplied by Mr. Stafford L. Austin, C. Brewer and Company.

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